Boosting the Robots to Higher Production Rates

Another KCC Software Application Story

In the semiconductor industry, automated production by robots is common due to cleanliness requirements and the harsh nature of many of the chemicals used. When a robot is asked to perform a specific, repetitive task (i.e. assembly), the robot programming is rather straight forward. When the robot must make decisions and provide a variety of tasks in a priority order, then the programming gets a bit more complicated.

A wetbench is a proceeding station where robots move product through various chemical baths to achieve the process goals. These are used to develop circuits, to clean wafers and masks, to etch, and to perform plating. Some wetbenches can have as many as 20 different chemical baths and be served by as many as 3 robots. Many process steps are critical not allowing process over-dwelling – not even one second.

When Amerimade Technologies needed their robots to achieve a higher throughput, they turned to KCC Software. KCC Software worked with Amerimade controls engineers and customer process engineers to develop their throughput rules. A recursive Visual Basic algorithm (application) was then developed that enforced the rules. This application is responsible for all scheduling pre-moving robots into position and determining which moves are to be made in what order.

One of the great challenges to this algorithm is that interruptions (i.e. a process bath lid may not open as fast as expected) occur constantly to cause production to take longer than was scheduled. Thus, the algorithm must constantly monitor the process making difficult decisions based on strict priorities. The goal is throughput, but only after the critical process steps are protected.

Like a master chess player, this algorithm must anticipate all possible moves and situations as a consequence of each move. Before a decision is made, the algorithm plays out all possible moves to insure safe production is possible until only one process is left running. If such a safe path exists, the next move is made at the exact moment required.

Wetbenches may have from 1 to 3 robots and any number of chemical baths (up to 50). The algorithm adapts to the specific wetbench configuration and bath designations to offer a customized and effective solution regardless of the wetbench configuration.

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